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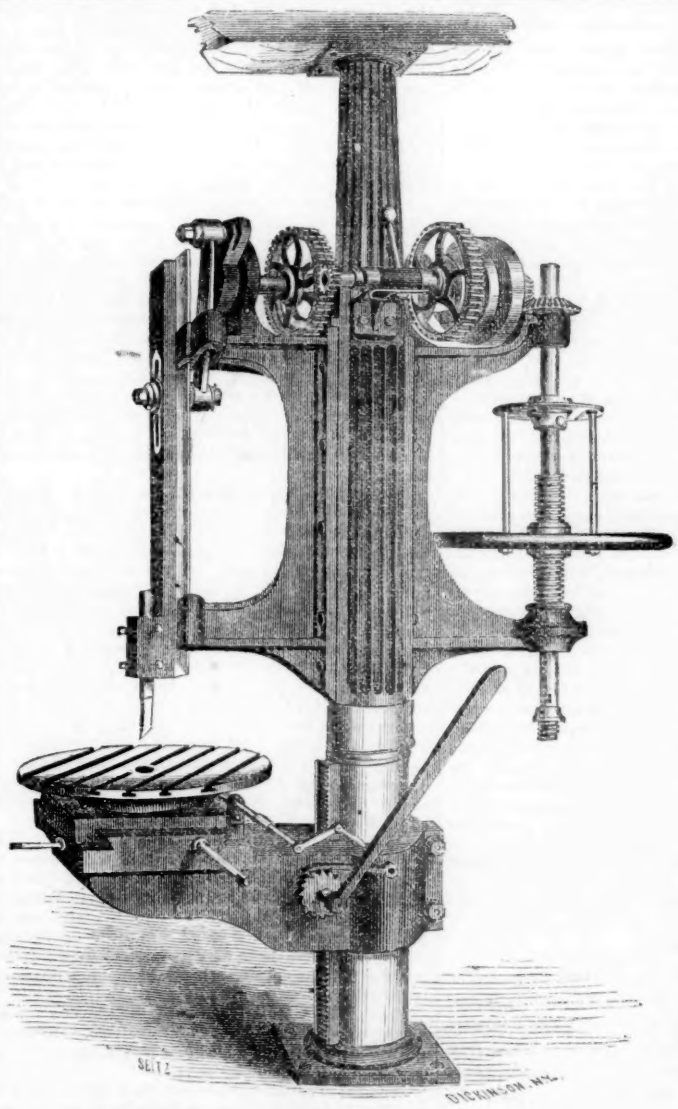
Combined Slotter and Drill.

Invention is ever endeavoring to simplify and improve the various machines intended to work and fashion iron for the multifarious conditions in which it has to be employed.

The combined Slotter and Drill herewith illustrated is one of the last and best improvements in this line. It will be observed the upright is strong, and can take the place of a column in a building. Both arms are fastened to it, and on the lower part the table revolves, and can be placed either under the Drill or Slotter, or on one side out of the way. The table is moved vertically by means of a rack and pinion; and, with the exception of self-feed, has all the movements of the regular Slotter, viz.: parallel, vertical, cross and circular. It is strongly back-geared, has large and wide cones, weighs about 3,500 pounds, and is particularly adapted to shops whose wants do not justify the purchase of the regular machines—the price being much lower. For drilling of all kinds, key seating, and work to which a Slotter can be profitably applied, the inventors confidently recommend this tool. The stroke of the tool-bar can be regulated to anything under twelve inches, and it will either drill or slot to the centre of forty inches. Counter shafts complete, and wrenches furnished.

The Gould Machine Company manufacture these machines, and further particulars may be obtained at their office and Works at Newark, N. J., or at their warerooms, 119 Liberty street, N. Y.



COMBINED SLOTTER AND DRILL.

The New Atlantic Cable.

The manufacture of the new Atlantic telegraph which is to be submerged between Brest and a suitable terminus on the shores of the State of New York, is progressing satisfactorily. The new cable is almost identical in construction with those which were completed in 1866, the only difference being that the diameter of the conducting copper ore is slightly greater, and the outside wires are of homogeneous Bessemer steel galvanized, having a breaking strain of about 1000 lb., while the wires outside the existing Atlantic lines have a breaking strain of only about 800 lb. The new cable will be laid in two lengths—one from Brest to St. Pierre, in deep sea, of 2325 miles, not including slack; and the other from St. Pierre to the terminus, of 722 miles in length, not including slack. The latter section will be similar to the Persian Gulf cable, as it will have to be laid in comparatively shallow water, and its exterior wires will be protected with Bright and Clark's Patent Siliceous Compound, which consists principally of powdered flint and pitch. The construction of the shore ends will be similar to that of the existing Atlantic line, and will gradually become thinner until they assume the deep sea dimensions.

During the summer her majesty's ship "Gannet" took soundings along the proposed route, and from the results of the operation, it is understood the bottom of the ocean is nearly the same in character as the bed in which the existing cables are laid, and of about the same depth. Little but mud and ooze were found along the route. In order to avoid the dangers of injury from rocks and icebergs, the new line will be laid to the south of the present cables, below the southern edge of the Great Bank, so that it may be laid in deep water. Sir James Anderson, who will command the "Great Eastern" during the expedition organized for the submergence of the line, has made the following observations regarding the Newfoundland Banks:

"By keeping in the 500 fathom line upon the Milne Bank, and around the southern edge of the Grand Bank there is no possibility of ice or any other agency that can be suggested injuring the cable. The northern edge of the Grand Bank was avoided, because it is uncertain at what depth the icebergs ground. They are said, upon good authority, to ground at times in ninety fathoms. It is not certain at what depth the vessels employed in the seal trade may sometimes choose to drop an anchor for the purpose of keeping in the track of ice floes. These dangers are avoided by the track chosen for the proposed cable, and I am justified by my own experience in saying, that the track from the southern edge of the Grand Bank to St. Pierre, and thence to the place of landing in America, is entirely free from any danger from ice, and does not cross any anchorage resorted to by the fleet of fishing vessels."

The breaking strain of the new steel cable will be seven and a half tons, and the strain required for submersion need not be more than 14 cwt. Even if at any

time it be necessary to haul up any portion of it that is now laid, the strain need not exceed a ton and a half in the deepest water. The weight of copper forming the conductor of the existing Atlantic cables is 300 lb. per knot; in the new cable it will be about 400 lb. The "Great Eastern" has arrived at Sheerness, from which place she will proceed with the cable probably in the end of next June. After leaving the Medway she will go to Brest to finish coaling, and will thence start on the telegraphic expedition.—*Morgan's British Trade Journal.*

The Darian Ship Canal—Prospects of the Success of the Scheme.

The Darian Ship Canal, that is to make a navigable channel through the Isthmus of Panama, has assumed a shape that insures its success. Ever since Cortez first viewed the two oceans from an elevation on the Isthmus, this magnificent project has been the dream of philanthropy and liberal enterprise. The Spaniards, the English, and the French have repeatedly, during the last 300 years, sent expeditions to solve the problem. No less than 19 canal routes, and seven railroad and common road lines have been contemplated. Not only governments have felt an interest in the great enterprise, but individuals have encountered the loss of fortune and life in more than one instance, while trying to realize the stupendous scheme. The execution of this cut is now admitted to be practicable, and the New York millionaires have taken hold of it in earnest. Yankee skill, Yankee capital, and Yankee engineering will before long consummate this, the grandest achievement of modern times, not even excepting the Pacific Railroad. Our Government, it is understood, are prepared to take a final survey of the Isthmus, with reference to a determination of the best route for the canal, and to negotiate with the Republic of Colombia for its consent to the undertaking, and its concurrence to the proposed arrangements connected with the enterprise. This they do with the pledge that the canal company will be ready to furnish $100,000,000 as the money required, in order to complete the work on the canal.

There have already been several surveys of this Isthmus, with reference to the inter oceanic communication. The idea of a canal across the Isthmus—which varies in width from a little more than 100 miles to something less than 50 miles—was broached as early as the days of Philip II. of Spain; and a partial survey was made by his authority, about the year 1528. But insuperable difficulties were met with, and the idea was abandoned. In 1826 the plan was revived by a New Grenadian engineer, and a route surveyed. Another and more formal survey was made by authority of Bolivar, in 1827–'29. In 1843 the French surveyed for a canal, and obtained a favorable report, and from that time to the building of the Panama railroad, 1850–'55, the subject continued to be agitated, but without any practical results. Now, however, it is to be hoped that the set time has come to begin this much mooted and most important international undertaking.

The present proposed plan is to build a canal large enough to allow any ship in the world, except the "Great Eastern," to pass from ocean to ocean, without unloading, and to have it free to all nations and neutral in all wars. Vessels are to pass and repass by paying a stipulated sum per ton and per passenger; the ports at either side to be free, except for goods intended for consumption in the Republic of Colombia. The charge on ships in ballast is not to exceed 76 cents per ton, $2 per ton loaded with merchandise, and on passengers $10 per head may be charged. The company is to have a grant from the government of exclusive right of way for 99 years, and is to pay the government six per cent. of the clear profits for 25 years, and eight per cent. for 74 yeors, for this privilege.—*Exchange.*

Petroleum as a Fuel for Locomotives.—The Emperor of the French, on his way to the Camp, found at Chalons a train drawn by a locomotive heated with petroleum to take him on the remaining 28 kilometres. He got up on the locomotive with the engineers, to observe the working of it. For a long time past, the *Moniteur* says, the Emperor has taken great interest in the researches and experiments that had to be made before the desired end could be obtained, and petroleum used as a combustible in locomotives. The following is the plan: On a brick slab, behind a vertical grating, is burnt a stream of oil flowing from a tap, by means of which it is perfectly easy to regulate the production of the steam, and the development of the power. The *Moniteur* says the experiment was completely successful.

Chemical Repertory.--No. 3.

DECEMBER 2, 1868.

Under this head it is my purpose to lay the foundation of what, I trust, may grow in time into a most important, if not the leading, department of this Journal.

Time will be a necessary element in the erection of this, as of any edifice intended to be substantial and enduring. I hope to enlist the assistance of American chemists. This may be an ambitious hope, but time will show.

I shall most cheerfully offer explanations and reply to questions on chemical points, addressed to me at this office; and I solicit all such.

HENRY WURTZ.

6. THE DUST OF THE UNIVERSE.

In the original Greek, the word "Meteor" means *on high, sublime;* and few subjects of modern research tend more to lead our thoughts on high, and into speculations of all others most sublime and elevating. The time is wholly past when any natural phenomenon or class of phenomena can be looked upon by any well-balanced mind as inscrutable, much less as supernatural, or encouraging superstitious fancies. Even the "live thunder," to which our forefathers would crouch as at the threatening voice of an angry Deity, we now regard as *voz et preterea nihil*, or rather recognize it as a sure announcement of a danger *past*, and say to one another that he who perishes by the flash will never hear the roar. The sentiment of grandeur and exaltation is left still; but what brought once a paralysis of terror, has by Science been converted for some into an actual source of delight. The moment it becomes apparent to the mind of man that these seemingly abnormal, and therefore astounding, voices and apparitions which beset him, are subject to immutable laws, so much so that his fellow men can make them matters of *prediction*, his superstitious fear of them is gone; and he is henceforth free to look upon them calmly, as but normal manifestations of the energy which pervades the Universe, and as so many guides or clues which, diligently pursued, will lead him into the recesses of the wondrous machinery, and nearer to the great Main Spring that moves it all. I do not know that this illustration has been before presented, in this shape, at least, of the *necessity*, to the full scope and development of the human intellect, and especially to the steady *unimpassioned* march of human Science, of a fixed faith in the Omnipotent Self-Exisient Cause; the *only real* mystery that is beyond our ken.

In the multitude of accounts we have in the public prints of the late meteoric storm, one point is a subject of frequent allusion, which calls up to the *chemist* of this day considerations of profound interest. I refer to the frequent observations of the nebulous *trains*, of immense length, left by these messengers from outer Space. The New Haven observers report that one train, which remained visible for *three-quarters of an hour*, and assumed before disappearing a *horizontal* form, measured twenty miles in length. I would suggest that, as the chances are almost infinite against the two ends of this train having been equidistant from the observers, its length was doubtless far greater, possibly hundreds of miles. Its assuming horizontality, after having passed through, as stated, the form of the letter S, seems to be best explained by supposing such a change of position that the edge of the S was presented to the eye.

Of what *material* are these trains composed? This is the *chemical* point involved. It is to be hoped that some of our skilful *spectroscopists* were at hand with their highly improved instruments. Since Father SECCHI has analysed stars of the eighth magnitude with his instruments, our boasted American spectroscopes should not have been here at fault.* *Two things* the chemist may at once tell the astronomer, without spectroscopic aid—

First: The material was *solid*, not gaseous; as a gas would, of course, be at once dissipated by diffusion in the atmosphere. (The idea of a *liquid* fog or mist will scarce be entertained by any).

Second: The light by which they were visible was not that of *incandescence;* as that could last but a few seconds. It must therefore have been either reflected light, or a *phosphorescence;* most probably the latter, as there was no moon.

Now, what materials have we, which, after having undergone combustion or volatilization; under a temperature comparable only to such as that of HARE's blow-pipe, for example; furnish a condensed product continuing to phosphoresce strongly for as much as three quarters of an hour? Here is a starting-point for investigation. Another question is: what became of this material? Evidently here we are obliged to conclude that it settled, or will settle, to become a portion of our solid Earth; and further, that the Earth is receiving constant accretions in this manner from outer Space. This dust from Space must be settling on the Earth continually, since it is rarely that a clear nocturnal sky can be contemplated even for a minute, without witnessing the fiery passage of one of these cosmical "motes that people the sunbeam," into our atmosphere. The hypothesis some hold that they belong to the *tails of comets* is not of easy acceptability. However that may be, it is clear that the known velocity with which they strike our atmosphere (or with which our atmosphere strikes them, amounting to the same thing), 25 miles per second, nearly one hundred times the velocity of the swiftest cannon-balls, is sufficient to dissipate them almost instantly into vapor; or burn them, if combustible (as those composed of *iron* are, of course); whence the material of the trains they leave behind. No chemist will doubt that if a cannon-ball could be made to start in motion at anything like this rate, it would instantly kindle and be dissipated as it progressed, in a few seconds, as an elongated cloud of iron-oxide smoke. Would such a smoke be phosphorescent? This seems a point readily determinable by those who have the appliances necessary. Occasionally one of these fragments, through a concurrence of causes unnecessary to detail, may last long enough to reach the lower and denser atmosphere, and have its motion so retarded that its temperatnre will fall below the point of combustion or volatilization (it will be *blown out*, so to speak), and reach us as an *aerolite*. Aerolites often show that they have *never been melted*, or even probably red hot, except superficially; a fact which is wholly in accordance with these views, since the whole time of their passage through the atmosphere can be but a few seconds, and there is *not time* for the heat to penetrate into the interior. Those inclined to be skeptical about the possibility of these bodies "striking fire" with the atmosphere, may be reminded that they themselves can reproduce the very phenomenon with the common fire-syringe and a piece of tinder; the difference being simply that a harder atmospheric blow is required to kindle the meteors than the tinder. The transition is natural, in this train of thought, to the sublime views of the illustrious MAYER, as to the meteoric origin of the Solar heat, and therefore of all the living energies which dwell upon our globe; but the subject has already spun out too long for our columns.

H. W.

* Indeed, it would appear from the following item, condensed from an exchange, and now of some months date, that the spectroscope should be capable also of analyzing the direct light of some of the meteors themselves, notwithstanding their rapid flight:—Mr. BROWNING has invented an ingenious contrivance for reducing the angular velocity of meteors, so as to enable him to obtain their spectra. With this device he has found it easy to obtain in the spectra of balls shot from a Roman candle, the characteristic Ba, Sr, and other lines.

CHEMICAL *EXCERPTA.*

Under this head I purpose to gather in the most *condensed* form practicable, from such recent scientific journals, both at home and abroad, as come under my eyes; the substance of such articles as seem deserving thereof. In this work, I shall not, as might be thought, hold myself confined to novel facts alone; regarding new hypotheses, and even speculations, when involving labor and ingenuity in the *generalization* of facts, as even more valuable to Science. It is hardly necessary to add that in my own comments, to which a degree of personal responsibility attaches, a less condensed style than in the abstracts themselves will be inevitable.

HENRY WURTZ.

[*Chemical News*, No. 463—Oct. 16, 1868.]

(Pages 188–9.) *Xylole* (also *xylene*), $C^{16}H^{10}$, one of the hydrocarbons of coal-tar, is found likewise in Rangoon and some other petroleums, and largely also in rosin-oil. LINDLOW & OTTO, operating on a xylole of boiling point about 284° F., have obtained a new acid, xylolsulphurous acid $C^{16}H^{10}S^2O^4$, by converting it first into sulphoxylolic chloride, and then reducing with *sodium-amalgam*. Among the reactions of xylolsulphurous acid, which is a yellow, nearly inodorous oil, soluble in ether, benzole and alcohol, insoluble in boiling HO, probably the most noteworthy is the action of fused hydrate of potash, which reconverts it directly and *entirely* into xylole and SO^2, with formation, of course, of two equivalents of monosulphite of potash. The air gradually oxidizes it into *xylolsulphuric acid*, $C^{16}H^{10}S^2O^6$. Another chemist, WROBLEFSKY, operating on xylole, converted it into oxyxylole, or xenole, $C^{16}H^{10}O^2$; by evaporating a mixture of xylolsulphate of potash with an excess of potash-ley, and heating the dry mass for an hour to 572° F. Water being then added, with HCl, the xenole was distilled over in a current of steam. It boils at 417.5° F., is little soluble, in water, but readily in alcohol and ether. Acted on by Na and CO^2, it gives an acid, xyletinic acid $C^{18}H^{10}O^6$, which in aqueous solution strikes a violet color with Fe^2Cl^3.

Metamorphoses of benzole. The same chemists quoted above, LINDLOW & OTTO, found that by fusing one equivalent of *sulphobenzolic amide* and adding 2 equivalents KO, HO, a violent (the *Chemical News* has it "violet," doubtless an *erratum*), reaction takes place, with formation of a new body, which is soluble in water; from which solution acids throw down the original amide. They think the new body to be an amide derived by the substitution of H by K. If the heat rises to 480° F., or higher, SO^2 and phenolate of potash appear; the benzoylic molecule undergoing its usual metamorphosis by the alkali:

$$C^{12}H^5, NH^2, S^2O^4 + 3(KO, HO) = 2(KO, SO^2), + C^{12}A_5, KO + NH^3 + 2HO.$$

H. W.

(Page 180.) A communication on the action of sugar on Cu solutions, by COMMAILLE, will be brought in hereafter in another connection.

(Page 187.) Notes are given of one of BERTHELOT'S late papers on derivatives of the hydrocarbons, this one being on the *styrolene* series. In view, however, of the masterly abstracts given on these subjects by Dr. WOLCOTT GIBBS, in the *American Journal of Science*, our too limited space may be more properly devoted to other items. H. W.

(Page 188.) A subject of the deepest interest was presented to the French Academy, Aug. 24th, by M. SALET, in discussion of the remarkable action of heat upon that anomalous compound, peroxide of nitrogen (hyponitric acid). Its density decreases rapidly up to 109–110° F. Above this the ratio of decrease diminishes, and at about 300° F. it ceases altogether. ADOLPHE WURTZ has supposed that at low temperatures this compound has a molecule NNO^8 = 2 volumes, and that heat *dissociates* these, so that it becomes 2 molecules $\left.\begin{matrix}NO^4\\NO^4\end{matrix}\right\}$ = 4 vols., each having 2 volumes. SALET finds that at the temperature at which its density corresponds to the formula N^2O^8, *it is colorless;* and infers that it is the compound NO^4 only that is colored. The item, however, is rather obscure, and will have to be cleared up by reference to the original. H. W.

(Page 189.) On the authority of the same great chemist is given a new method of obtaining *peroxide of silver.* The + pole of two of BUNSEN'S cells, being a plate of silver, and immersed in water containing either sulphuric acid or NaO, SO^3, "becomes covered with a black coating of amorphous argentic peroxide." None is formed in saltpetre solution, but the latter becomes filled with flocks of AgO.

[Argentic peroxide, to which the composition AgO^2 is assigned, was discovered by RITTER, and obtained by WALLQUIST (*Jour. für prakt. Chemie*, xxxi, 179), in brittle iron-black octahedrons by passing weak voltaic currents through concentrated solution of argentic nitrate. WOEHLER believes that it is *ozone* (becomes, as is well-known, perceptible to the smell, when a Pt pole is substituted for the Ag) that does the work of peroxidation. According to WALLQUIST, ordinary oxygen is at the same time evolved from the + pole. These things are related to a large subject, which I hope soon to present in a form more or less elaborated.—H. W.]

(Page 190.) F. WOEHLER, in correspondence, recommends for the separation of PO^5 from bases, to dissolve in a little nitric acid, add first AgO, NO^5, then AgO, CO^2 and shake well. All the PO^5 is converted into insoluble argentic phosphate, and the solution of the bases may of course be freed from Ag by HS or HCl. In the quotation no reservation is made of cases where *iron* or *alumina* are present. If this method is really applicable to these latter cases, it is almost a philosopher's stone for analytical chemists. H. W.

(Page 194.) In regard to the determination of nitrates and nitrites in natural waters, S. W. RICH makes the important suggestion that in case of water containing much MgCl, and deficient in alkaline carbonates, it is necessary to accuracy, in all cases in which the water must first be evaporated, to add beforehand a weighed quantity of NaO, CO^2. Otherwise, by virtue of the known decomposition, during evaporation, of MgCl, the HCl thus set free is liable to react with and decompose the nitrogen acids. H. W.

(Page 195.) MUSPRATT gives a new analysis of another Harrogate mineral spring, called the "Magnesia Water," which, like the one I have already condensed (issue of Nov. 16, p. 147) illustrates the interesting fact of important *changes* taking place in these waters. This one yields now in the Imperial gallon (70,000 grains), about 14.6 grs. MgO salts, chiefly carbonate, 216 of NaCl, 28 of KCl, 1.22 of BaCl, 0.7 of sulphide of sodium, with traces of Fe, Mn, I, Br, Sr and Li, the latter two being merely in *spectroscopic* proportions. HOFMANN'S analysis, in 1854, showed sulphate of lime, now not present, no BaCl, and less KCl and MgO salts. Used in dyspepsia, rheumatism, gout, hepatic diseases, etc. H. W.

[*Chemical News*, No. 464—October 23, 1868.]

(Page 200.) STAEDELER points out that in the making of the important agent *permanganate of potash* from the crude manganate (chameleon mineral) by simply heating the dilute solution of the latter, one-third of the MnO^3 is reduced to MnO^2 and lost; and that even if concentrated solutions are produced, by the action of HCl on the chameleon, one-third of the Mn present is likewise lost as MnCl. He advises, therefore, the use of *chlorine.* Chameleon is first digested for several days in its own weight of water, as much more water added, then Cl transmitted till the liquid is red. It is then diluted with agitation with four times its volume of water, filtered through pounded glass, and evaporated to one-fifth of its original volume; when 90 per cent. of the MnO^2 originally consumed crystallizes out as permanganate, purifiable by recrystallization. H. W.

(Page 200.) A Belgian chemist, name not given, proposes to manufacture Cl gas *without manganese*, by heating, in a current of dry air, a mixture (very intimate, it is to be supposed), of 3 equivalents of a haloid chloride, such as *common salt*, with one equivalent of anhydrous *ferric tersulphate.* All the Cl of the salt, it is stated, is evolved. The reaction, in this case, should be very simple:

$$2NaCl + Fe^2O^3, 3SO^3 + O^3 = 3NaO, SO^3 + Fe^2O^3 + Cl3$$

If true, this seems practically quite important. Let those engaged in experimenting on gold ore by PLATTNER'S "chlorination process" look to it. H. W.

(Page 201.) GAIFFE states to the French Academy, that he finds the plan of LECLANCHE, of a *voltaic battery*, in which pounded coke is placed around the carbon, gives good results; and recommends it in all carbon batteries, as considerably augmenting the surface of the carbon element and bringing it nearer to the surface of the porous cell, thus obviously diminishing the internal resistance. In the case of sulphate of mercury and sulphate of lead batteries, he found that *constancy* was almost attained, the needle receding only 1 degree in 24 hours, from 28° to 27°. This M. GAIFFE is doubtless the same ingenious chemist who a few months since made butterflies with gorgeously-colored extended wings, and other similar objects, out of the "solar phosphori," formed in the old-fashioned way by igniting sulphates with carbon, the colors of which were only rendered visible *in the dark* by previous exposure to the blaze of burning magnesium ribbon. H. W.

(Page 201.) BECHAMP, in two communications to the French Academy in Sept. last, announces the fine discovery of a *caproic fermentation of ordinary alcohol;* that is, one whose chief product is caproic acid, though other products occur, such as hydrogen, hydride of methyle, acetic, valeric and caprylic acids, and others. Into dilute alcohol are introduced chalk containing microzymae, and a little *washed meat*, or syntonine (purified fibrine of flesh). The methods of separating and purifying the crude products are not clear enough from the abstract, and reference must be had to the original Memoirs of BECHAMP. H. W.

(Page 202.) A correspondent named LIPPINCOTT presents strictures upon the crude and unreliable modes of observing the amounts of Ozone in the atmosphere, upon which so much absurd labor is now expended; and says: "I believe that if observers would all employ test papers of a *uniform* quality, expose them in the *same* way and for the *same* time, many of the discrepancies at present so apparent in the registration of ozone would be found to disappear." It is to be hoped so, but it is to be feared *not*; but he is doubtless right in adding that "At any rate, the experiment is worth trying." Few *new* experiments are *not.* H. W.

["*Le Chemiste*," of Brussels, 1868.]

(Page 316.) Quotes from "*Science pour tous*" an article on the product called "irised paper" (*papier nacré*), which appears really to promise at present useful as well as ornamental applications. The invention is attributed to RICHTER, of Paris, but is in reality quite ancient, at least in America. RICHTER used the poisonous acetate of lead for producing the crystalizations; hence his products were highly objectionable, but PUSCHER has substituted a solution of MgO, SO^3, to which dextrine mucilage (containing some glycerine) are added; 3 oz. of each material in 3 oz. water. The paper is previously sized with gelatine, dried, the mixture applied with a brush, and then placed in a heated room, till the crystalization appears. PUSCHER produces variations of color with *aniline* preparation. These surfaces are far more durable than those obtained with sugar of lead. It is asserted that PUSCHER has actually reproduced these surfaces perfectly on lithographic stones, on copper plates by electrotype process, and so on; and here come in his suggestions as to practical applications. Of course, every such crystallized surface will possess an individuality of pattern, wholly impossible to copy or reproduce in any known way (except by photography). PUSCHER proposes therefore the printing in this way ground-patterns, etc., for bank-notes, and similar documents, to prevent *counterfeiting.* The paper must be tinged *yellow*, so that it will not photograph. [Of course a yellow incapable of extraction by chemical means?—H. W.]

(Page 337.) *Picric Acid Gunpowder.*—It is not surprising that the well-known violently explosive nature of the salts of picric acid should have attracted attention in these days. BARLINETTI, of the University of Padua, has tried mixing picric acid with KO, ClO^5, and finds the product to detonate under a slight pressure. He finally discovered that a mixture of 10 saltpetre, 10 picric acid, and 8.5 bichromate of potash, behaves like the best sporting powder, without exploding by percussion. Finally he succeeded in leaving out the saltpetre, and producing a stronger powder, from equal parts of the other two. It is not hygrometric, leaves little residue, and may possess some advantages for certain uses.

PAYEN has informed the *Société d'Encouragement* that M. CLEROITAD has studied the applicability of *picrate of potash* as a gunpowder; and claims that it possesses many advantages. It detonates at 310° C. (590° F) In the open air its products of combustion contain cyano-hydric acid and NO_2, but in a closed space they are but nitrogen and oxygen gas, and KO, CO_2 mixed with carbon. The advantages claimed are its absolutely *definite* character, composition, and strength; absence of sulphur, which rapidly destroys artillery; ease and safety of manufacture; insolubility in water (1 lb. requires 200 lbs water—25 gallons, for solution, and complete destruction; a quantity which would wholly destroy a very large quantity of ordinary gunpowder). On the other hand, when dry, it has the same objection as gun-cotton, of exploding by simple percussion. It is claimed that its initial bursting force upon the breech can be controlled without detriment to the initial velocity of the projectile; by admixture with inert substances, saltpetre, etc. Equal parts of saltpetre and the picrate are recommended; and it is stated that this composition is already manufactured at Bouchet. Of course, however, this mixture is divested of the advantage of *insolubility* claimed Some pyrotechnic mixtures are also proposed; for a gold yellow, equal parts of the picrates of potash and iron—a beautiful bluish-green, 2 of picrate of ammonia and 3 of BaO, NO_5—a beautiful red, 54 of picrate of ammonia and 45 of SrO, NO_5.—H. W.]

The Mining and Scientific Press, of San Francisco.

[Of this important Journal, thanks are due to the Editors, for the recent receipt of complete files for some two years back. The assiduity and discrimination of this Journal in the collection of Scientific Intelligence, are wholly without parallel in a community so young; and its columns convey a striking view of the surprising activity of inquiry, invention, and even of discovery, in our Pacific States, whose gigantic future needs no prophetic power to foresee. The "embarrassment of riches" is the predominant emotion produced by inspection of its overflowing columns. Effort will soon be made, however, to mete out, within our crowded space, such small justice as may be to Californian progress, and to this, its most worthy exponent.

Under this head, I can now but add that, perceiving recent communications in the *Press* from some of its able and intelligent local scientific contributors on the mode of formation of gold-nuggets, to which I have myself given some study, I feel it not altogether out of place to say that I propose soon to contribute my own mite to this discussion through its columns.—H. W.]

Utilization of Coal Tar in Berlin.—The Berlin gas works furnish about 180,000 hundred weight annually of coal tar, which they sell for from 30 to 40 cents per hundred. Of this tar, about five-sixths are used in the preparation of roofing paper, and the application to buildings. The remaining sixth is subjected to dry distillation, the portion passing over at a temperature of 176 to 257 deg. of the Fahrenheit's scale, and consisting principally of benzole, being taken by the aniline manufacturers. The products of a heat of from 257° to 320° F., sold to the India rubber factories, the price decreasing as the boiling point rises. The oil passing over at from 320° to 752° F., contains various complex atoms, in which the radical phenyl principally occurs. Should pure carbolic acid be desired, the temperature is not carried beyond 392° Fah. The product of the higher temperatures is used principally for impregnating railroad sleepers and telegraph poles, and is therefore frequently called "impregnation oil." The final residuum amounts to about 65 per cent. and is sold in that state to the manufacturers of asphaltum, who add chalk to it, and form it into various other combinations.—*Phil. Ledger, Oct.* 20.

Light.

[In the November number of the *Journal of Franklin Institute*, the ingenious editor, Prof. HENRY MORTON, whose recent stupendous experiments in the Philadelphia Academy of Music have excited so much interest throughout the world; reports, in continuation of this course, another lecture, from which we extract the following highly interesting matter.—H. W.]

The planet Mars is undoubtedly wrapped in an atmosphere loaded with vapor and clouds, and possesses a surface diversified by oceans and continents, lakes and peninsulas. To illustrate this he gives telescopic pictures and adds:

The growth and decrease of the snow zones, which surround either pole, and which creep out in the winter of each hemisphere, and melt away again as the time of summer comes to each, is also a curious evidence of a series of meteorological and climate phenomena, wonderfully in accordance with our own terrestrial experience. The consideration of these things gives us a vivid impression of the wonderful revealing power of the agent, which we are now studying.

We often admire the wonders of the electrical messenger and his timeless flight, annihilating distance, and bringing together the ends of the earth, but what are these achievements compared to those here accomplished.

The electric fluid flashing along the cable-covered wire, can give warning to the coast of England, that a tempest has begun its march across the broad Atlantic, and although now a thousand miles distant, will soon be howling across the chalk cliffs of the island and thundering into its bays, but here the swifter footed light, flashing out from the sun across the fields of space, and turning back to us from its momentary resting place on the continents, or oceans, the mountain summits or their cloudy crowns, the polar snows or equatorial desert, of this distant planet, tells how a tornado of snow and sleet is at the same instant sweeping over that globe *thirty-five millions of miles away.*

As to the physical constitution of the planet Jupiter, he says:

You see a series of belts of an irregular form, but following the line of the planet's equator, and these by their form and by their changes, indicate that when we look towards this planet, we see little more than the cloud masses of its watery atmosphere, drawn out into such zone-like lines, by the action of trade winds.

You now see in turn, the planet Saturn, with his eight satellites and his rings. These last, which have since their discovery been among the mysteries of the universe which seem to defy human ingenuity, are now believed to be, not continuous masses of matter, but troops of satellites, minute, innumerable, closely arrayed, yet moving in independent harmony. A choral band, sweeping in majestic measure round their ruling centre and primary.

Among our reasons for so regarding them, the most prominent are these: When they have been in such position as to be seen edgewise, breaks have been observed in their substance. Now, a break in a continuous ring, it is easy to prove, must result in its speedy destruction of form and congulation into a globe, without the possibility of a restoration to the annular shape, but in a swarm of circling planets, such gaps might nrturally occur from time to time, and close again without disturbance.

Other changes inconsistent with the continued existence of a continuous mass, are also noticed, such as the longitudinal splitting of the rings, and it is also believed that a scattered interior mass of these minute planets has formed within the inner ring in modern times, being the result of collision and consequent infalling of the revolving fragments. This cloud, called "the veil," was first seen in 1850 by Bond and Dawes, with difficulty, in their powerful instruments, but is now easily discerned with an objective of but four inches aperture.

On other pages of the same number, we find the following extracts, which we reproduce, as connected with the same subject:

"*On the Sun as a Variable Star.*" By Mr. BALFOUR STEWART. The author, after a preliminary discussion, and disposal of the various unsatisfactory hypotheses which have been suggested in explanation of the phenomena of variable stars and periodicity in sun spots, proceeds to enunciate, in a concise form, a theory not unfamiliar in many points but now most completely expressed.

The photosphere or visible surface of the sun, is conceived, as in most modern theories, to consist of cloud masses, or to be a surface of condensation terminating the ascending currents of vapor which are constantly rising from the central mass. The faculæ or portions of superior brightness often observed and frequently accompanying sun spots, are portions of this cloudy matter which have reached an excessive height in the solar atmosphere and thus escape the absorbing or light-obscuring influence of that medium.

The fact that these faculæ as a rule predominate on the following side of a spot, indicates to us that they have been projected from a lower to a higher region, and thus, by reason of their slower motion, fall behind in the more distant and therefore more rapidly moving regions into which they have been projected, exactly on the same principle which explains the westerly motion of our trade winds.

On the other hand, as shown by the observations of Carrington, sun spots have a forward motion with reference to the adjacent regions of the surface, thus indicating that the influence producing them has descended from a higher and more rapidly moving region. This influence Mr. Stewart supposes to be a down-rush of the colder and absorbtive atmosphere which follows the explosion or uprush by which the faculæ were projected outwards.

Such being the nature of sun spots, the cause of the periodicity is next examined, and it is shown, from the observations of Messrs. De la Rue, Stewart and Leowry, which we have before noticed, that the period of ten years, now well established, depends upon the influence of the two planets, Venus and Jupiter; the one being effective by reason of its nearness, and the second by its mass.

"The sun is to be conceived as an immense mass of intensely heated gaseous and dissociated matter, so condensed, however, that, notwithstanding its excessive temperature, it has a specific gravity not much below that of water; probably offering a condition analogous to that which Cagniard de la Tour observed for volatile bodies when submitted to great pressure at temperatures much above their boiling-point. The radiation of heat, going on from the surface of such an intensely heated mass of uncombined gases, will produce a superficial cooling, which will permit the combination of certain elements and the production of solid or liquid particles, which, suspended in the still dissociated vapors, become intensely luminous and form the solar photosphere. The condensed particles, carried down into the intensely heated mass, meet with a heat of dissociation; so that the process of combination at the surface is incessantly renewed, while the heat of the sun may be supposed to be maintained by the slow condensation of its mass; a diminution by 1-1000th of its present diameter being sufficient, according to Helmholtz, to maintain the present supply of heat for 21,000 years."—Prof. STERRY HUNT.

This hypothesis is due, as our author remarks, to Faye, and seems to accord best with our present knowledge. It is especially worthy of note that it accords with the observed fact, that the intensity of the sun's emitted rays corresponds with those derived from chemical combination, while other considerations would lead us to assign the primary source of the solar temperature to a much more intense origin, such as the heat developed by impact of meteoric matter, a source omitted, but not excluded, in the above hypothesis.—*Journal of the Franklin Institute, Nov*, 1868.

Photograph of Invisible Light.—We have just received, through the kindness of a friend, a photograph of the actinic portion of the solar spectrum, showing the absorption bands (as well of course as the intermediate luminous spaces), from a to n, of which all beyond n are invisible. This picture is made by the use of lenses and prisms of quartz, as glass, even of the thinnest kind, entirely obstructs these rays. It was prepared as one of the illustrations for the new edition of Miller's Physics (the German copy) and may be there found.

In Becquerel's last book, just published, "La Lumiere," admirable copies of this photograph will be found in both volumes. It is engraved on steel, and being printed with a dark brown ink, is hardly distinguishable from the original.

The difficulty of producing such a photograph is very great, and certain imperfections seem as yet inseparable from the result. Thus, as we have mentioned, all the apparatus through which the light passes is of quartz; but quartz is a double refracting medium; hence, even if we so cut the prisms and lenses from the crystal as to reduce the disturbance from this cause to a minimum, it will exist and produce a notable effect.

Prof. William A. Miller, of London, made a very thorough investigation of the "photographic transparency of bodies," in the hope of finding something which could be substituted for quartz with advantage in this respect, but without success.

It is for the reason above noticed, we presume, that this actinic spectrum is deficient in the perfect definition of lines, which characterizes the spectrum of the visible and actinic rays, produced by Mr. L. Ruther furd, of which we have also a copy before us.

This photograph is forty-one and a half inches in length, and shows the part of the spectrum from the beginning of the blue (the green being absolutely devoid of photographic power, as has been demonstrated by Mr. Rutherfurd), up through indigo and violet to the limit of visibility, and of the rays which will traverse glass.

The sharpness of definition and fineness of lines in all parts of this spectrum is so great, that nothing more could be apprehended by the eye without the aid of a lens.

Comparing this with the German spectrum, we find that the space in the latter between the letters G and H measures about seven-eighths of an inch, and shows about thirty-one lines, while in that of Mr. Rutherfurd, it measures sixteen inches, and shows at least 600 lines. This greater expansion is of course due to the use of a greater number of prisms, but if attempted with those of quartz, would introduce such errors as to obliterate in all probability all the existing lines.—*Journal of the Franklin Institute, Nov.*, 1868.

The New York Society of Practical Engineering.

[REPORTED FOR THE AMERICAN GAS-LIGHT JOURNAL.]

This Society held its regular fortnightly meeting on the evening of Tuesday, November 10th, at their rooms, 24 Cooper Building; the president, James A. Whitney, in the chair, when a highly interesting paper was read on the subject of "The Cause and Prevention of Railroad Accidents," by Dr. A. W. Hall, of this city. As introductory to the subject he paid a glowing tribute to the wonders already worked out by the steam engine, and read a lengthy poem describing the grand future of steam achievements, and proceeded to classify the different accidents that were more common and destructive of life, and considered the most obvious means of preventing them, according to the present state of science and mechanics.

He named, as the most destructive cause of accidents, the breaking of rails, and went into a careful comparison of the merits of steel and iron rails. While it was admitted that steel rails would last many times longer than iron, and, as a matter of economy, commended the good sense of those companies who were adopting steel rails, he doubted their great superiority in point of liability to breakage over good iron, and instanced cases where steel rails have broken in midsummer as abruptly as pot metal. He explained how it was not surprising that even the best rails that could be manufactured should break when, on many roads, a thousand car wheels a day pass over a single rail, equal in weight to a thousand sledge hammers. It was only wonderful that more rails do not break. He stated that it was the prevailing idea among thinking men that some device will yet have to be invented to keep cars from leaving the track, even should both rails break at the same time.

Accidents from carelessness of the servants of the company, such as open switches, drawbridges, and the negligence of flagmen, could only be prevented by the severest penalty inflicted against such employés as a warning to others; and recommended the heaviest exemplary damages against the company, whenever the fault was not on the part of the passenger injured.

As a third class, collisions direct and indirect were considered, in point of destructiveness, entitled to that place. He pointed out the causes of collisions, and believed that with competent men in charge of trains, no such accident need ever occur, if conductors were provided with a perfect time table, accurate time pieces, a well understood code of signals, and with a telegraph office at each station.

The writer then took up the burning of cars, not as a separate classification, for this nearly always was caused by broken rails, collisions, misplaced switches, etc. But the importance of the subject, and the utter needlessness of such casualties made it more necessary to give it special consideration. He disapproved of the use of wooden cars, and denounced the whole practice of using combustible material in their manufacture, as well as the use of stoves and kerosene lamps, as behind the age, and insisted that government should prohibit, under a severe penalty, everything of the kind, the same as it has compelled steamboat companies to carry life preservers. He explained a very simple arrangement for warming cars with hot air from a small iron furnace car attached to every passenger train. The cars could be connected by pipes with flexible couplings, the same as tender and locomotive, and the hot air be conveyed up through gratings in the bottom of the car, under the feet of passengers when it was more needed, and could be easily changed in summer to supply cool air, and thus ventilate the cars.

He next referred to those accidents caused by the breaking of car and locomotive axles, and showed how nearly all such accidents might be prevented if railroad companies had the enterprise and skill to construct testing devices for proving the strength and soundness of axles at different points on the road. He showed how simple such a device was, and made the surprising statement that no such apparatus was in use on any road. He instanced the recent breaking of a driving axle on the Hudson River road, where one half of the fracture was old, and that the locomotive had been

in use in this dangerous condition for, perhaps, months, and there was no skill among the mechanics of that road sufficient to devise a machine for discovering the flaw, which spoke badly for the engineering proficiency of the country.

Obstructions upon the track—such as horses, cows, etc., could be entirely prevented, if every road was fenced in as it should be; and no company should be permitted to escape the highest damages when an accident occurred from such neglect. Even stones and trees falling upon the track, which the company had left in dangerous proximity thereto, ought not to be classed as providential, to screen those who are really the guilty parties. He recommended the best system of steam brakes to be instantly applied by the engineer, who of course is first to see the danger ahead; and to meet such emergencies at night, commended the improved calcium light for locomotives, which, by its great power would enable the engineer to see obstructions in time to avoid them.

The doctor finally gave an explanation of his own improvement for keeping the cars from leaving the track when rails break. It was by laying extra or safety rails near the common rails, and providing car wheels with an additional tread on the opposite side of the flange, so that this tread would run directly over the safety rails but not touch them (being one half inch less in diameter than the working tread.) till the rail breaks or gives way, when the wheel only has to settle till the additional tread rests upon the safety rail, which will carry the car forward to the next sound working rail, without the least danger of leaving the track. This improvement was explained at some length, and as its great cost appeared to be the principal objection to its adoption, the writer showed if old or worn rails were used for safety, which will answer every purpose, and are only worth two cents a pound, almost any road could soon be provided against this terrible class of accidents by the funds alone now paid out for broken cars and slaughtered passengers, to say nothing of the loss of the confidence and support of the traveling public from those repeated disasters, which sentiment was received with applause by the audience.

The Dublin Water Supply—Foul Reservoir Bottoms.

The London *Builder* of October 24th says the water supplied at great outlay to Dublin from the Roundwood reservoir is pronounced undrinkable by the consumers. The Roundwood reservoir lies in a valley, one end of which is closed by an embankment, while the Vartry—a sufficiently pellucid stream—enters at the other. The bottom of the reservoir is composed in part of peat-bog, and hence, it is said, the impurity of the water. In process of time, no doubt, the peat in the Roundwood reservoir will either be washed thoroughly or rotted away, and then the water will become pure, but the process must be tedious, and for years the water supply of Dublin may be defective. Unfortunately, in the case of the Dublin Waterworks, washing cannot be effected. The Roundwood reservoir takes two years in filling, and to empty it now would be tantamount to postponing the supply of water to Dublin from the Vartry for at least a year. It is not easy to suggest any remedy other than the emptying and refilling of the reservoir. Water attained by percolation through peat cannot be purified by any filtering power which a great water company can be expected to employ. It is somewhat remarkable that engineers seldom pay the smallest attention to the character of the soil on which they propose to store up water, except in so far as its peculiarities are likely to affect the permanence of the storage embankment.

A physician, writing to one of the Dublin papers, suggests a reason for the impurity of the new supply which deserves attention here. He asserts that the valley of the Vartry was for many years thickly populated, and that the soil has been greatly contaminated by excreta and sewage matters which, now being dissolved out, render the water bad.

Manufacture of Steel.—A new process for the manufacture of steel, called the Heaton process, is attracting much attention in England. The prominent feature of the process is the use of nitrate of soda. This salt is introduced into the converters, and by its very rapid decomposition affords such a quantity of oxygen, and so thoroughly diffuses it through the melted mass, that it effectually removes sulphur and phosphoros, the obstacles which have hitherto chiefly retarded the production of steel from certain ores. Judging from accounts contained in foreign scientific publications, great diversity of opinion prevails in regard to the value of the method, and its real merits cannot at present be estimated.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith —EDS.]

Petroleum and Salt in Louisiana.

NEW ORLEANS, November 11, 1868.

MESSRS. EDITORS: The existence of petroleum in Louisiana is no longer a matter of doubt. For several years past attention has been directed to surface manifestations in Calcasieu parish, and more recently two companies were formed in this city, for the purpose of developing the fact as to the existence or non-existence of petroleum in paying quantities.

Within the past thirty days the Louisiana Petroleum and Coal Oil Co. have sunk a well upwards of 400 feet, meeting with rock at 333 feet, since which a small supply of crude oil was met with at every step. At about 400 feet a bed of lime stone was struck 10 feet thick. On passing the lime rock a soft porous rock was found, and from a crevice in this rock petroleum and gas escapes into the well in considerable abundance. The superintendent estimates the daily flow of oil into the well at about 200 barrels, and of a superior quality; but the flow of gas is so strong, as greatly to interfere with the workmen—almost blinding them; supposed to result from an admixture of ammonia in the gas.

At a meeting of the stockholders last night, steps were taken to build tanks, forward barrels, etc. One week ago the stock of the company stood at par; today their $100 shares are held at $500 each. A limited number of shares of $100 were yesterday offered by the company at $500 each, which were readily sold.

Heretofore none but capitalists have embarked in this enterprise, but at this time the interest and excitement manifested is more general, and is fast approaching the interest formerly taken in the Pennsylvania wells at the north.

The Louisiana Petroleum and Mining Company are at work, and have their well about 300 feet deep with a fine show of oil.

Recent geological and mineralogical surveys demonstrate not only the existence of petroleum, but also that of iron, lead, copper, coal, lime, salt, soda, copperas, and gypsum, in the upper and western portions of the State in great abundance. One bed of copperas is about fifty feet in thickness, and the salt at Petitaunse Island, covering a large area, is of unsurpassed purity, and of unknown depth.

Shafts have been sunk into the pure rock salt from fifty to sixty feet. When blocked out or lying in the bed it resembles in purity and appearance solid ice. This bed of salt is but eleven or twelve feet beneath the surface of an alluvial deposit. Indian baskets and fragments of rough earthenware are found upon and very near the upper surface of the salt-bed, showing that from this source they formerly obtained their salt. This mining territory is supposed to be far more extensive than was at first supposed and easy of access.

It is believed by many of our most reliable merchants, that Louisiana salt and petroleum will very soon exercise a heavy influence in the sale of these commodities from other localities.

Your obedient servant,
J. E. WALLACE.

The McKenzie Method an Old Invention!

ALBANY, November 20, 1868.

MESSRS. EDITORS: I have lately noticed in the columns of your Journal various statements explaining what is called the McKenzie method of making gas from powdered Virginia coal mixed with petroleum or its residuum.

As the authors of these communications are under the impression that the above method is novel, I write to say that it is nothing but a part of "The Aubin Process in Gas Making," and that years ago Kanahwa coal ground fine and mixed with petroleum, and also with its residuum, was used in many Aubin gas works, both public and private.

Very respectfully yours,
H. Q. HAWLEY.

Removal of Gas Tax.

SANTA CRUZ, CALIFORNIA, October 29, 1868.

MESSRS. EDITORS: I am of opinion that the "small" gas companies of California would co-operate with like companies in the East, to procure the removal of the "odious" tax on gas. Respectfully,

C. E. BURROWS,
Sup't Santa Cruz Gas Co.

About Our Coal Interest.

The Winter's List of Prices—Coal at Retail—News from the Coal Fields—Where Our Coal Comes From—Prospects for the Winter.

[*From the New York Mercantile Journal.*]

At present coal retails in the city at $10.50 per ton, for red ash, and $10 for white ash. British cannel sells at $23, and Kentucky (or domestic cannel) at $19 per ton. These quotations show an increase of from one to two dollars over the prices of the same time last year. Ordinary stove coal is in great demand, and very scarce; prices have naturally risen in consequence. The latest news from Pennsylvania report a rise from 25 to 50 per cent. on all Eastern shipments of coal, and with a prospect of a still higher rise in rates. This, if declared, will have a disastrous effect upon the trade in that quarter, and, probably, check it altogether. Last week, 90,968.03 tons were sent ever the railroad to Philadelphia. This is a gain of 9,377 tons sent over the same route during the corresponding week of last year. The highest prices ever paid in the city of New York for coal were given in the winter of 1863–64, when ordinary range coal sold anywhere from $15 to $18 per ton. The lowest prices of recent years have been paid during the present summer, when stove coal had sunk as low as $5 and $6 per ton. The recent compromise with the miners in Pennsylvania at an advance of 15 per cent., and a return to the old ten hour system, in lieu of the demanded 20 per cent. and eight hour, has placed affairs, by mutual agreement, on an assured footing, at least until the end of the present season. Transportation from the Schuylkill district is still exorbitant, thereby embarassing the market for this variety of coal nearly as much as at this time last year. For every ton passed over the railroad from Reading to tidewater, the sum of one dollar eighty-five and eight-tenth cents is required. This, it is complained, is fully double the legitimate rates. Reports from the Scranton district are also anything but promising.

Few persons, comparatively speaking, outside of the trade, are aware of the fact that there is actually no real bituminous coal found in the United States. Much is sold under that name, but all of a semi-bituminous character. The most of this comes from Maryland, Kentucky, Western Virginia, Iowa, Illinois, Missouri, and Indiana. That species which more nearly approximates to the English cannel, is known as the Kentucky or Breckenridge cannel. The Cumberland is all of a semi-bituminous description. The staple coal product of the Union is, however, anthracite. A recent analysis of the Iowa coals gives them 58 parts carbon to 41 of bitumen; and, in the better specimens, only about 7 per cent. of ashes. This proportion is, also, in a great measure, true of the coal of Illinois. In both States, it is noticed, and in fact in all districts, both east and west, that the coals of a bituminous character invaribly were to be found in the western, and those of the anthracite in the eastern parts of the same coal fields.

The oldest coal field in America is that known as the Richmond or Chesterfield Coal Basin, which extends on both sides of the James river, to within fifteen or twenty miles above the city of Richmond. This mine, during the last century, afforded the only supply of domestic coal in the county. It is said to have been discovered by a little boy, while digging for cray fish, and is semi-bituminous.

Fully two thirds of all the coal consumed by the whole country comes from the State of Pennsylvania. This, in the main, is anthracite. A considerable portion is, however, of a bituminous character. Of the coal yearly burnt by this city alone, statistics give about 50 per cent. to the Lackawanna district, and 25 to the Lehigh. The remainder is divided among the rest of the coal producing States.

In 1850 the total product of the mines—according to government record—distributed through twelve States, was valued at $7,173,750; of which some $5,268,351, or upwards of 75 per cent., was the value of the anthracite mined in the State of Pennsylvania. In ten years' time, between 1850 and 1860, including returns from sixteen States and Territories, and from 632 establishments, of which the aggregate capital was $29,428,670, in the year 1860 the product swelled to 6,218,080 tons, or 155 452,030 bushels of bituminous coal, and 8,125.842 tons of anthracite coal, valued together at $20,243,637. This shows an increased value of not less than $13,069,387, or 162 per cent, over the returns of 1850. The internal revenue tax on all mined coal is 3½ cents per ton. In 1864 the amount realized by government from this source on Pennsylvania's quota of 1,249,211 tons was $437,192. The whole amount from the entire mining interest was but $572,436, which proves conclusively that Pennsylvania alone contributed over four fifths of the total returns. But although this State monopolizes the lion's share of the anthracite trade, in limited quantities this same coal is found in

the States of Rhode Island, Massachusetts, Missouri, Texas, Iowa, and Illinois The anthracite coal region of Pennsylvania is divided into three principal districts. First, the Northern or Wyoming district, where anthracite coal was first applied to practical purposes. This region comprises the Shichshinny, Wilkesbarre, Newport, Pittston, Lackawanna and Carbondale, in all an area of about 120 square miles, or 76,805 acres. It is celebrated for the very hardest species of white ash coal. As early as 1775, the first cargo was shipped from this region, down the Susquehanna, to Carlisle Barracks. Secondly, the Southern or Schuylkill coal field contains three principal basins, and extends on the east from the Lehigh district nearly to the Susquehanna on the west. This division embraces the districts known as the Lehigh, Tamaqua, Tuscarora, Schuylkill Valley, Pottsville, Minersville, Swatara, Lyken's Valley, and Dauphin, together with several other minor districts. Its area of workable coal is estimated to be 164 square miles, or 106,960 acres. Thirdly, what is known as the Middle Anthracite coal region of Pennsylvania, extends from Shamokin to the Lehigh, and covers fully seventy-three acres of good coal land, or about 115 square miles, divided between the two large basins of Mahoney and Shamokin, and a few smaller collieries, and an eastern cluster of from twenty or thirty smaller basins, such as Beaver Meadow, Hazleton, etc.

The Cumberland mines were not worked until 1842. The Scranton were not opened until 1856.

Of the relative value of the two coals, red and white ash, the latter is much preferred for domestic use; for though the latter (anthracite) in consumption deposits more ashes, the heat is thought to be much more intense. Indeed, the better qualities of anthracite have been sufficient to decompose and burn water when submitted in small quantities to its fierce heat. Bituminous coal leaves a red ash, and but little of it. It burns with a greater flame than the former.

The manufactories are the largest consumers of coal. Next in order is the ordinary domestic cooking range. The judgment of experts gives 25 per cent. of the city's consumption of coal to the latter source, and about 35 per cent. to the former.

Foreign coals are imported into the United States almost exclusively from Great Britain and the British provinces, and in spite of our immense domestic products importation seems to be on the increase. The English cannel is in great demand, principally for gas-making purposes in the eastern seaboard cities. The duty on all foreign coal is $1.10 per ton of 28 bushels. The Reciprocity Treaty, of course, insures coal from the provinces free of all duty.

A Word about Kerosene.

The season of the year has returned, says the Boston *Journal of Chemistry*, when the consumption of kerosene is greatly increased in families, consequently there is increased activity on the part of unprincipled makers and venders of dangerous mixtures. Be careful of whom you purchase your supplies; have nothing to do with the numerous "Eureka," "Solar," or "Crystal" fluids; they must of necessity be fraudulent or dangerous. Probably numerous irresponsible parties in the large cities will get up new *names* for mixtures, warranting them *inexplosive*, and send travellers through the country selling "recipes" to make and "licenses" to vend the abominable fluids. It will be safe to have all such men arrested at once, for obtaining money under false pretences, or for violation of the United States law relating to burning oils. *Remember, no safe and good burning oil can be devised, cheaper or more economical than properly manufactured kerosene of legal standard.* Consequently, when our readers are told by a reckless vender, or travelling mountebank, that they can furnish a *new article* which is cheaper and better, inform them that the statement is false. There have been no new discoveries in chemical science which will enable persons to manufacture hydrocarbon fluids to burn in dwellings, which are cheaper or better than pure kerosene oil. Another point must be kept in view. No chemical substance, liquid or solid, can be added to dangerous kerosene to render it inexplosive without destroying its illuminating properties; and still another: all safety-lamp devices are useless. Consumers do not need any safety devices to burn good oil, as no explosions can occur from its use. Kerosene of legal standard is perfectly safe under all conditions.

—Mr. Samuel C. Bishop, of New York, has obtained a patent for a new insulating compound for telegraph wires and other electric conductors, which is very much cheaper than india-rubber or gutta-percha, or the compounds of those materials previously used, and is said to be very effective and durable.

PATENT CLAIMS.

Pertaining to Gas, Water, etc.

84,047.—WATER WHEEL.—J. H. Bodine and T. A. Hill Mount Morris, N. Y.

We claim, 1st. The arrangement of the top-feed vertical discharge wheel, B, in connection with the flanges, a, a, upon the lower edge of a curb, which has the gate at its top, its side walls being water-tight, substantially as and for the purposes herein set forth.

2d. The gate, I, when cast with recesses or concaves, e, e, on its under surface, substantially as specified.

3d. The arrangement of wheel, B, gate, I, arm, r, screw-shaft, T, block, R, working upon the screw-shaft, and spindle, S, operating the screw-shaft by means of cog-gearing, W, when said parts are constructed to operate in connection with each other in the manner and for the purposes above described.

84,079.—SAFETY APPARATUS FOR LAMPS.—Cephas Appleby, Lyndon, Vt.

I claim my improved arrangement of the air-pipe d', with the annular body, A, and its series, d, of gas-discharging holes.

Also, the combination and arrangement of the neck, c, and the male and female connection-screws, a, b, with the annular body A, the air-entrance tube, d', and the gas-educts or series, d, of discharging-holes, arranged in such body, as herein before specified

84,110.—HYDRO-CARBON BURNER.—John Gray, San Francisco, California.

I claim the above-described adjustable burner, consisting of the cylender, B, plug E, adjusting stem, D, and openings, a, a, constructed and arranged substantially as described.

84,112.—GAS AND STEAM FITTINGS—Albert Hallowell, Lowell, Mass.

I claim the mold or molds, constructed and arranged substantially as described, for the purpose of forming finished fittings, or parts of fittings, as and for the purpose specified.

84,148.—HYDRO-CARBON BURNER.—Edward W. Taylor, Norristown, Pa.

I claim, 1st. The improved process of producing in intensity, and at small expense, heat and other effects of combustion by burning petroleum and other liquid and liquescent fuel on the surface of an open plate, surmounted and combined with an incombustible covering, without the intervention of sand or other materials, the combustion being facilitated and the effect intensified by the employment of current of steam, passing into the fire-chamber, substantially as shown and described.

2d. The blast apparatus assisting in said process, being the arrangement described of the air-passage D, in combination with the steam-receptacle, E, arranged to move up and down, and the method of bringing heated steam into union with the air at a point and in a mode as described, so as to form a most intimate union, and at the same time creating a powerful blast, conveying the mixture into combination with the burning fuel.

3d. The combination of a fuel-plate with a blast apparatus, assisting in the combustion of liquid and liquescent fuel, substantially as shown and described.

4th. The slide, P, as a device for the purpose of accomodating hydro-carbon burners to fire-boxes and other spaces of varying sizes, without requiring the burners in such cases to be constructed on different scales.

Supply of Iced Water to Paris.—Every one who has visited the *cafés* of Paris must have observed the *carrafes crappees*, that is to say, water-bottles with a great block of ice, often very curiously crystallized inside. The production of these frozen decanters has become a very important operation, which is carried on in the ice-houses situated in the Boulevard Lannes, on the Passy side of the Bois de Boulogne. The establishment, according to the *Journal of the Society of Arts*, consists of ten great underground ice-vaults, protected from the action of the sun by buildings raised over them, and covered with straw. Each of the ice-vaults is nearly 500 feet long, and about 36 feet high, and the ten are capable of holding 10,000 tons of ice. The department in which the water-bottles are frozen is a curiosity. These decanters are two-thirds filled with filtered water in the receptacles of the freezing-machine, and the freezing is produced by means of salt water and vaporized ether, with the help of a steam engine of sixteen-horse power. When the water within the decanters is reduced below freezing-point, it is rapidly stirred with a stick, when the freezing takes place as if by magic. More than 6,000 of these frozen *carrafes* are sent out daily in hot weather, at a very trifling charge, and each being filled up with fresh water as often as required will serve during a long summer day, and cool ten gallons of water.

Coal in Russia.—The foreign scientific journals report that recently large and most important discoveries of coal have been made in Russia. The mines of one district alone are, according to the St. Petersburg journal *Golos*, capable of supplying annually 400,000 tons for 150 to 200 years. Since 1864 there have been surveyed in the valley of the Don more than eighteen billions of tons. The *Golos* asserts that the mineral wealth of Russia far exceeds that of England, and at the same rate of production would last for two centuries after the English mines had been exhausted.

Prices of Gas Coals—Dec. 2.

PROVINCIAL.

Duty, $1 25	Coarse. Gold.	Slack. Gold.
Block House	$1 75	$0 75
Gowrie	1 75	0 75
Lingan	1 75	0 75
Sydney	2 13¾	0 71½
Pictou	2 13¾	1 18¾
Little Glace Bay	1 75	1 00
Caledonia	1 60	0 75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.	$8 50	$8 00
Despard Coal Co.	8 25	8 00
Penn	3 50	8 00
Newburgh Orrel Gas.	8 50	8 00

Delivered in New York.

PRICES OF FOREIGN COALS—DUTY $1.25 PER TON.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
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Liverpool House Orrel, ser'd	$18@$20
" " Cannel, ser'd	$22

Per ton, 2000 lbs. delivered.

—Several patents have been recently taken out in Australia for the preservation of Australian meat for exportation, and various establishments of this kind are in operation, and are reported to be extending the business with the cities of London and Hamburg.

—The spire of the new cathedral in Pittsburgh is to be surmounted by a hollow iron cross fourteen ft. high, which is to be illuminated with 300 gas jets.

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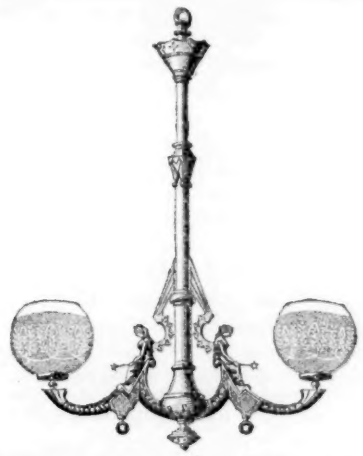

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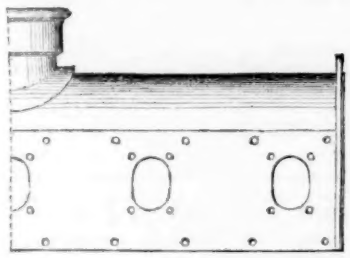

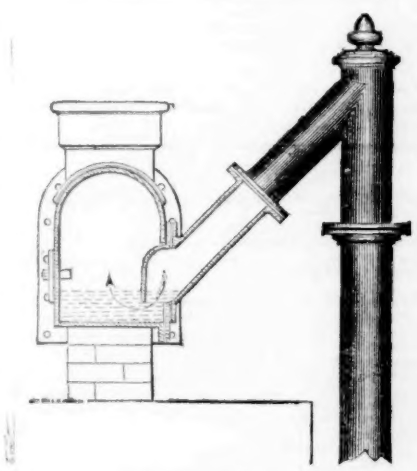

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[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

WEDNESDAY, DECEMBER 1, 1868.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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Answers to Correspondents.

J. S. of Marysville, Ky.—We published not long since, a law passed by the New York Legislature, prohibiting the collection of rent for gas meters. We are not aware that any similar law has been passed in any other State; the Legislature of your State can pass a similar law, and relieve the citizens of the payment of rent for the meters.

G. J. of Ohio.—Phogene gas is known in chemical nomenclature as chloroxicarbonic gas. Its formula is CO Cl. It is produced by the union of equal volumes of carbonic oxide and chlorine gases, which, under the influence of the solar rays, unite and form the new compound. This gas has a peculiar suffocating odor, which is readily recognizable.

F. M. P., of Minn.—One volume of olefiant gas requires three volumes of oxygen to insure its perfect combustion, the result of which is two volumes of carbonic acid gas.

J. S., of Ill.—The lime light, the calcium light, and the oxyhydrogen light are identical with the Drummond light, as it was called after Lieut. Drummond, who introduced it.

E. W. B., of N. H.—The Worthington water meters are pronounced to be very reliable, and have given satisfaction wherever used.

☞ A few replies to correspondents have been crowded out of this issue, which will be printed in our next.

THE IMPROVED LIME-PROCESS OF PURIFICATION OF THE MANHATTAN GAS-LIGHT COMPANY.

The report upon this subject, by Professor HENRY WURTZ, announced in our last issue, has been published by the Manhattan Company in very elegant style, through our press. We shall endeavor to find room to insert the whole of this important document, in a subsequent issue, but at present, the following extract, specifying in a few words the nature of the new invention, must suffice:

"2. *The Lime Process of the Manhattan Gas Co.*

"Under this head, Mr. President, I have to describe what I cannot but view as the most practical improvement in gas purification that has been made in more recent times. This improvement may be set forth as follows:

"After the purification of the gas in the ordinary 'Dry-Lime' apparatus, the foul lime, just as it remains in the purifiers, is *revivified* therein by the method of 'ventilation,' known as that of *Palmer* (specified in his patent of April 17, 1847, as 'the using of atmospheric air to be blown through the lime purifiers before they are opened for the removal of the refuse lime'). As practiced by your Company, the ventilation is effected by *drawing* air from above downwards through the fouled purifiers; but the special and novel improvement I refer to resides in a supplementary device, which is simply *the passage of the foul effluvia from the revivification through a secondary Dry-Lime Purifier.*"

We are enabled to add, that through the liberality of the Manhattan Company, whose wish appear to be to diffuse freely a knowledge of their improvement throughout the community, we have been furnished with a limited number of copies, which those interested in the management of gas may obtain by calling at our office.

TUCKER BRONZE MANUFACTURING COMPANY.

A late visit to the warerooms of the Tucker Bronze Manufacturing Company, 128 William street, New York, gave us some new ideas regarding the rapid strides the public are making in the matter of taste and refinement, which is exhibited nowhere, perhaps, more conspicuously than in the great variety of styles, elegance of designs, and beauty of finish in gas and lamp fixtures and the various articles of metal and bronze which go to make up an outfit to a modern residence, such as statues, statuettes, medallions, brackets, clocks, cornices, and various articles of furniture ordinarily made of wood.

The name bronzed iron is given to Mr. Tucker's productions on account of their having the color and appearance of bronze castings, although the articles are not coated with bronze nor with copper, or any other metallic compositions such as are usually employed in the manufacture of imitation bronze. Mr. Tucker's invention consists in treating the iron castings with vegetable oil at an elevated temperature, so as to produce upon the metallic surface a skin of oxide, which, in combination with the decomposed organic substance, gives the desired color and appearance.

The castings when finished and cleaned are carefully covered with a liquid oil all over their surface, and particular attention is paid to the removal of all surplus oil, so as to leave only an extremely thin coating upon the metallic surface. In that state the iron casting is ready for the oxidizing process. It is brought into a stove heated to the temperature which decomposes the oil without charring it. This temperature is the same which will impart to cast iron a blue tint when exposed to it with a clean metallic surface. At this temperature, therefore, the double process of oxidation of the iron, and of decomposition of the oil, takes place simultaneously, and the castings are covered with a brown coating of oxide which remains fixed to the surface with great durability, protecting the iron from further oxidation, and having the same lustre and metallic appearance as real bronze.

CHARCOAL AS A DISINFECTANT.

While sanitary commissions have consumed much time and labor, and have been profuse in their expenditures of money in their search for disinfectants and deodorizers, they have in many instances ignored the value of charcoal altogether, and gone off in quest of more expensive substances, which do not possess a tithe of the efficacy which is one of its characteristics. The cheapness of this substance, the ease with which it may be employed, together with other considerations, render it one of the most useful agents for sanitary purposes, known.

Even among scientific men, grave misapprehensions have existed as to the precise action of charcoal in contact with inanimate organic bodies. Many have supposed it to possess antiseptic properties, and have recommended its employment as an arrester of decay. It is true that the offensive odors arising from animal remains undergoing putrefaction are at once neutralized by the addition of charcoal in a state of powder. But this action is not owing to any antiseptic property but to the power of absorption which the charcoal possesses, and of concentrating within its pores the noxious effluvia, and thus removing all offensive odors from the remains subjected to its contact. That charcoal does not possess antiseptic properties may be easily proved by surrounding a piece of flesh with the powder; on examination after a lapse of a few weeks, putrefaction will be found to have ensued, and an advanced stage of decomposition reached.

The power of absorbing and concentrating gases within its pores is possessed by charcoal to a wonderful extent. One volume of it will absorb ninety volumes of ammoniacal gas, which is the maximum of its absorbent power—the minimum being hydrogen gas, of which it absorbs one and seven-tenths volumes. The amount of oxygen gas absorbed is equal to nine and two-tenths volumes. For a long time this peculiar absorbent power was thought to be the extent of the action of charcoal—or, rather, that the action ended when the saturating proportion of the substance to the particular gas submitted to its operation was reached.

Some time ago Dr. Stenhouse, a celebrated English chemist, made some investigations which served to throw much additional light on this subject, and invest it with an interest which before was not attached to it. From the results of his experiments he has demonstrated that the absorptive action of charcoal is not a mere passive reception of gases into its pores, but it exerts a peculiar power in inducing actual combustion of carbonaceous substances, by furnishing the quantity of oxygen necessary to this combustion, which it had previously absorbed. In other words, according to Dr. Stenhouse's theory, charcoal actually possesses the power of burning up organic substances at ordinary temperatures, and of resolving them into their ultimate products. This combustion of course proceeds moderately, and consumes far more time than if the substance had been burned by fire, but the effect is the same, and the same ultimate products are generated in both instances. This can be proved in a very satisfactory manner. A piece of flesh placed in a glass vessel and covered with powdered charcoal, and allowed to repose, will soon experience the effects of combustion induced by the charcoal, and the fact of the combustion of the noxious gases may be proved by exposing the usual test for ammonia (hydrochloric acid) near the charcoal in use, when

the white fumes which will arise afford an ample evidence of the complete consumption of the gases, which, but for the useful properties of charcoal, would be evolved in their normal state, and emit a disgusting stench. The action which takes place is very simple. The gases which are evolved by putrefaction are mainly composed of carbon, hydrogen and nitrogen, although phosphorus and sulphur are also present, but to a limited degree. These gases, passing through the charcoal, in the pores of which oxygen is absorbed, are oxidized or consumed, and the chief products arising from this new action are carbonic acid, water and ammonia—the ultimate products of the combustion of animal remains.

The investigations of Dr. Stenhouse have proved of some importance in a sanitary point of view, and have pointed to the use of charcoal in various ways for the purpose of preventing infection and contagion. Respirators filled with this substance are now worn in hospitals, so contrived as to protect the wearer from noxious exhalations. Filters for atmospheric air, in unwholesome and crowded districts, might be constructed, in which the injurious gases and vapors might be retained and consumed, and only pure air, with a slight admixture of the ultimate products of the combustion of impurities, be allowed to pass. Dwellings may thus be protected from malaria by causing the apertures through which air is admitted to be supplied with charcoal filters, when all deleterious gases will be arrested, and pure air, separated from its contaminations, will be freely admitted.

The principal cities of Europe have expended much money in appointing sanitary commissions to report upon the disinfection and deodorization of sewers Many chemicals have been experimented with—some of them being expensive and themselves giving rise to unpleasant odors. If charcoal will do all that Dr. Stenhouse claims for it, it is indeed a valuable agent in the hands of health committees; and towns and cities this side the Atlantic will find for it plenty of employment.

VENTILATION OF PUBLIC BUILDINGS.

We had supposed that the necessity of a complete thorough, and practical ventilation of public buildings and tenement houses was by this time universally acknowleged, and the means of obtaining it generally understood. We supposed that no public spirited man would stop short of such a consummation on economical grounds, for the very evident reason that so entirely convinced are people now-a-days with the sanitary necessity of a pure atmosphere, that they will no longer submit to be suffocated with the poisonous and disgusting effluvia arising from a crowded house, however tolerable the atmosphere in their own apartments may be. The frightful condition of the public buildings and tenement houses in New York, when filled with people, is unfortunately too well known.

We were led to these reflections while eking out an evening at Wallack's Theatre one night last week. It is a pretty play-house, so complete, comfortable, and genteel, and, in every respect but one, unexceptionable. The one exception is the heat to be endured—we mean its ventilation. The centre of the ceiling, partially concealed by the decoration, furnishes ventilation for perhaps fifty persons, and twenty feet from it is quite a large skylight capable of relieving the house materially, *when open*. All this is very well for those who are so fortunate as to be seated in the parquette, orchestre seats, or on the front sofas of either tier of boxes not under the galleries above. But woe to those who are doomed pass their hours under the ceiling of either of the tiers—ceilings hermetically sealed, between which and the floors beneath them the atmosphere becomes hot. sweaty, and foetid. Why is this? Why are there not six ventilating flues, at least two feet in diameter, in the ceiling of each tier, regulated by valves, and communicating directly with the open air? Why is not every column that supports those ceilings a hollow column, doing the double duty of sustaining the edifice above, and at the same time the vital energies of the audience below?

Architects will theorize and certify as to the efficiency of their plans, and the sufficiency of their remedy, but in the face of a test, for which time enough has elapsed, all this will merely serve to dissatisfy and dishearten those who are the unhappy victims of the experiment.

A NEW ITALIAN GAS JOURNAL.

The first number of an Italian journal, entitled *Il Gas*, has been placed upon our table. It is gotten up similar to the English journal, and contains about fourteen pages. It is neatly printed on large clear type, and presents altogether a creditable appearance. The paper is published in Milano, Italy, and is edited by Gaspare Gilardini. We are very sorry that we are not conversant with the language of the inhabitants of sunny Italy, as it would be desirable to present our readers a specimen of the gas literature of that country; but we shall have it examined, and any article worthy of translation we shall copy in these columns. We send greeting to our Italian brother, and he has our heartfelt wishes for his prosperity in his new enterprise.

SPECIAL NOTICE.

The Central Pacific Railroad, connecting San Francisco and the Pacific Coast with the Altantic lines, now nearly completed, and doing a large and remunerative way business, must speedily become one of the most important and valuable lines of through traffic on the continent.

The First Mortgage Bonds issued thereon having a lien superior to that of the United States, are now widely known and esteemed as among the safest, best and most profitable corporate securities for investment. A limited quantity will be sold at 103 and accrued interest, in currency. Principal and six per cent. interest payable in gold. Government bonds received in exchange at full market rates, allowing the difference in cash. Fisk & Hatch, bankers, etc, No. 5 Nassau street, N. Y.

GAS-LIGHTING BY ELECTRICITY.

We understand Mr. A. L Bogart, Chemist and Gas Engineer, of 702 Broadway, New York city, has lately contracted to light the entire gas burners of Booth's new theatre in this city by electricity.

The method employed is by the inductive spark, which is the best and simplest method yet placed before the public. By this arrangement a battery of six cells is equal to two hundred by the ordinary method.

THE MINING GAZETTE.—We are pleased to place this valuable paper among our list of exchanges. It in every way worthy of the great interest it represents, as evinced by its contents, which convey a large amount of valuable information. Among the most interesting articles, we notice one by Prof. Henry Wurtz, on "Gold Genesis." It is published bi-monthly, at Halifax, Nova Scotia, at $1.75 per annum.

PORTABLE GAS WORKS.—We shall shortly give illustrations, with description, of the *modus operandi* of the Springfield Gas Machines, so well and favorably known throughout New England. A general agency for the sale of these machines has just been established at 554 Broadway, N. Y.

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Warranted to SAVE GAS and give Satisfaction.

It has been in use for the past year in San Francisco and elsewhere, and all Gas Engineers as well as other experts give it the highest praise. The diaphragm being made of very THIN METAL, this Regulator is INDESTRUCTIBLE, and not liable to be effected by heat or cold. Can be easily adjusted to a Lamp already in use.

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These pipes can be laid with much greater facility than the common joint, are tighter when laid, and more secure against any disturbance of the joint by action of time or other causes.

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After using it extensively, and testing it thoroughly, I am fully persuaded that, as a connection for street mains, the "Robbins Joint" has no equal.

Its superiority consists of facility in laying, economy in time and lead, and, above all, its perfection as a Joint, thus saving largely in leakage. H. STACEY, Superintendent Indianapolis Gas Co.

We are entirely satisfied with the "Robbins' Patent Joint" for connecting our street mains. R. SALTER, Superintendent, Covington Gas Company.

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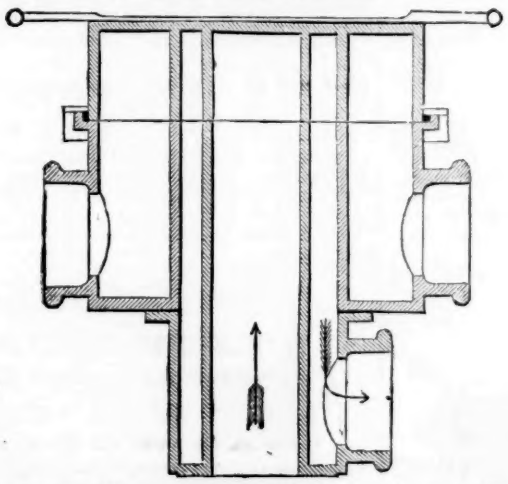

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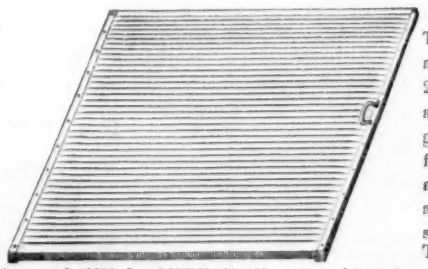

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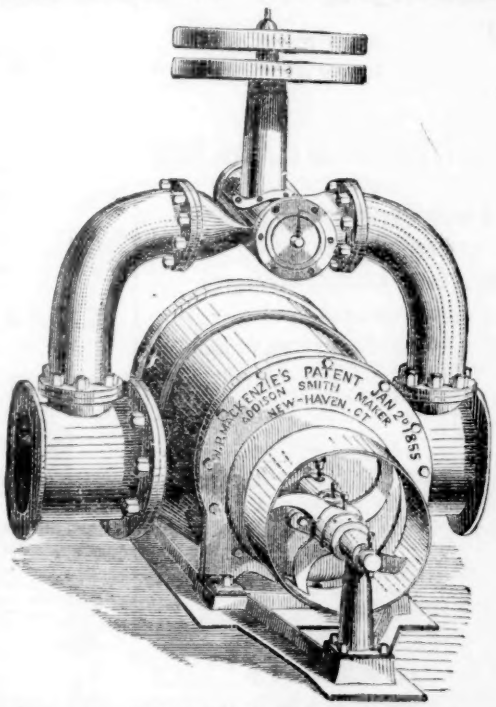

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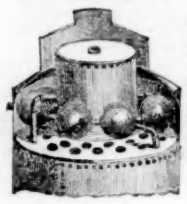

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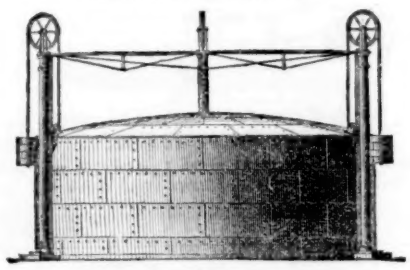

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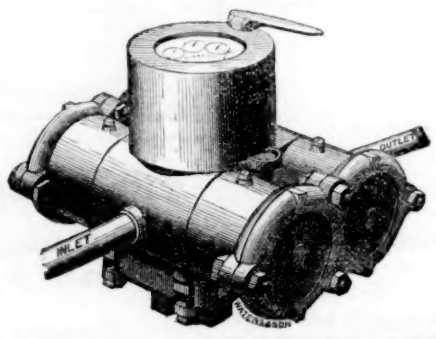

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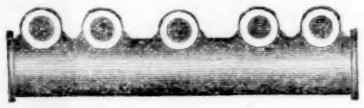

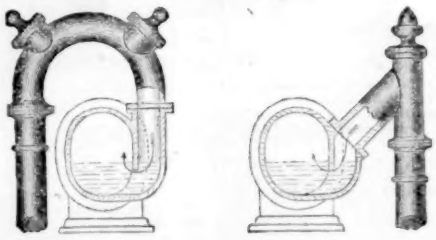

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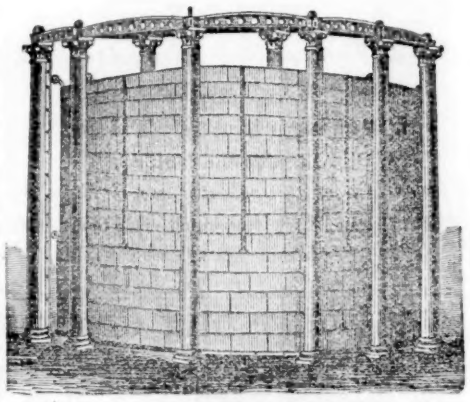

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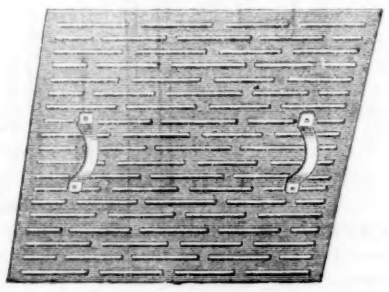

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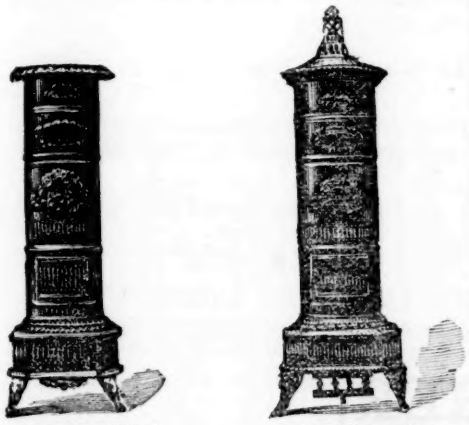

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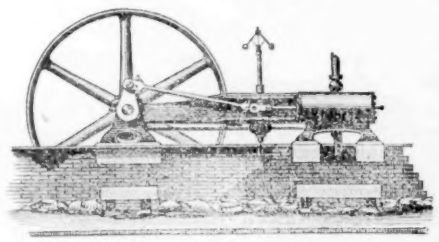

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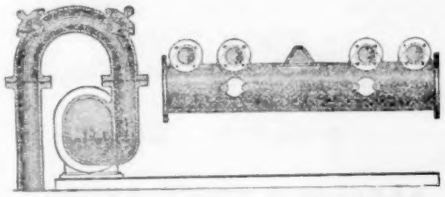

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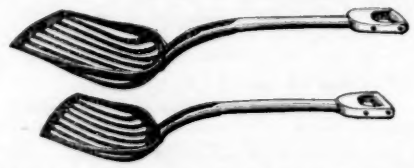

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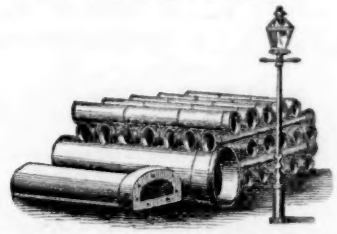

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San Jacinto,	.. "	20
San Salvador,	"	27
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Miscellaneous Items.

—An exchange says that Liebig, the chemist, complains that people are forever pestering him with letters asking questions of the most extraordinarily silly nature, such as they might answer for themselves by consulting any elementary text-books. They come at the rate of two or three hundred a day, and in eight or ten different languages.

—Bituminous coal was known and employed, says a scientific contemporary, by blacksmiths in the earliest ages of Greece; nevertheless, no indications can be had that it was employed largely in the metallurgy of iron. Such coal was found in Elea, on the road to Olympia, and in Liguria, where amber was also to be obtained.

—An experiment made by M. Louis de Henry is cited to illustrate the correlation of physical forces. If a glass flask, it is said, be placed on a small copper plate, and a magnet, with its poles pointed upward, be made to revolve rapidly in a vertical axis below this plate, an increased temperature in the air of the flask will be observed, which may be made sensible by any particular arrangement. It is supposed that by substituting for the plate and glass a copper vessel containing water, sufficient heat may be generated by the rapid action of the magnet to cause the water to boil. But would not heat be generated in suce a case whether the apparatus had magnetic power or not?

—The statement is made by a city exchange to the effect that "eggs may be preserved without difficulty by varnishing them with a solution of gum-arabic, and packing them in salt or immersing them in strong brine. The action of the varnish is to exclude the air, which otherwise finds access to the contents of the shell through the pores. The latter are effectually stopped by the gum solution." A mode adopted in Paris is better, as it produces the same results without affecting the external appearance of the egg. This consists in placing the eggs (small quantities at a time) into a cullender, and dipping them into a kettle of boiling water, where they are allowed to remain one minute; a thin layer of albumen next the shell is thus coagulated and becomes impermeable to the air. Packages of preserved eggs should be frequently turned to prevent the settling of the yolk to one side of the shell.

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Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the American Gas-Light Journal ... 2
Builder of Gas Works, Apparatus, Etc.—P. P. Deily, 39 Laurel street, Philadelphia ... 6
Begg's Lamp Regulator—Office Gas-Light Journal, 22 Pine st. ... 3
Cambridge Gas Stoves, Ranges, &c.—Gas Light Journal Offices, 8
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